Multiple launch rocket system 9K58 "Smerch"

Classification:

Basing:	Car chassis
Purpose:	Multiple launch rocket systems
Warhead:	Cassette , High-explosive fragmentation , Thermobaric , High-explosive
Control system:	Adjustable
The country:	Russia
Range:	90 km.
Year of development:	1987

The long-range multiple launch rocket system (MLRS) "Smerch" is designed to engage any group targets at distant approaches, the vulnerable elements of which are open and sheltered manpower, unarmored, lightly armored and armored vehicles of motorized infantry and tank companies, artillery units, tactical missiles, anti-aircraft systems and helicopters in parks, destruction of command posts, communication centers and objects of the military-industrial structure.

In the period from 1969 to 1976, the TULGOSNIITOCHMASH collective, together with specialists from related enterprises, carried out research work to study the possibility of creating and defining the appearance of the MLRS of the high command reserve. Decree of the Central Committee of the CPSU and the Council of Ministers of the USSR No. 1043-361 on the beginning of the ROC on the creation of a multiple launch rocket system "Smerch" was issued on December 16, 1976. Designing began under the leadership of General Designer of the SNPP "Splav" - A.N. Ganichev, and ended under the leadership of G.A. Denezhkina. At the end of December 1982, the Smerch system successfully passed state tests. The Smerch system was adopted by the Soviet Army on the basis of the decree of the Central Committee of the CPSU and the Council of Ministers of the USSR No. 1316-323 of November 19, 1987 and the order of the Minister of Defense No. 0334 of December 30, 1987.

A number of fundamentally new technical solutions embodied in the design of this system and the rocket make it possible to refer it to a completely new generation of weapons of this kind. By creating MLRS MLRSthe Americans came to the conclusion that the firing range of 30-40 km is the limit for MLRS. Its further increase leads to too large dispersion of shells. The rockets developed for the Smerch MLRS have a unique design that provides hitting accuracy 2-3 times higher than that of foreign rocket artillery systems. For the first time, Soviet rocket artillery shells were corrected. In their design, an inertial control system was used, which provides angular stabilization of the projectiles in the active section of the trajectory and the correction of the range due to the correction to the separation time of the warhead, determined by the onboard equipment in accordance with the measured parameters of the projectile movement. Thanks to its use, an improvement in the accuracy and accuracy of fire was obtained in comparison with unguided rockets of rocket artillery of previous generations. Also, in the design of the RS RA, for the first time, a composite solid fuel for a rocket engine was used, due to its high-energy characteristics, the flight range was increased (the internal channels of charges are different), a stabilizer block with six expanding blades. For the first time in the design of a combat vehicle, the following were used: a docking mechanism in the guide design, designed for docking (undocking) of connectors that provide electrical communication between the projectile onboard equipment and ground preparation and launch equipment designed to control the docking of the projectile to the guide, check firing circuits, data entry of the flight mission

and launch production; guide with two guide slots; witness device on the back plate of the package of guides to determine the temperature of the charge of the rocket engine of the missile. Later, the witness device was used in the design of the automated BM MLRS "Grad", mounted on a cradle; control cabin; protection that allows you to fire in conditions of the use of chemical, bacteriological and nuclear weapons by the enemy, followed by degassing of equipment and sanitary treatment of personnel; holders on the rear inner panel of the cockpit for attaching a grenade launcher, machine gun and machine gun; stands in the design of a combat vehicle for installing a machine gun, machine gun and grenade launcher in them witness device on the back plate of the package of guides to determine the temperature of the charge of the rocket engine of the missile. Later, the witness device was used in the design of the automated BM MLRS "Grad", mounted on a cradle; control cabin; protection that allows you to fire in conditions of the use of chemical, bacteriological and nuclear weapons by the enemy, followed by degassing of equipment and sanitary treatment of personnel; holders on the rear inner panel of the cockpit for attaching a grenade launcher, machine gun and machine gun; stands in the design of a combat vehicle for installing a machine gun, machine gun and grenade launcher in them a witness device on the back plate of the package of guides to determine the temperature of the charge of the rocket engine of the rocket. Later, the witness device was used in the design of the automated BM MLRS "Grad", mounted on a cradle; control cabin; protection that allows you to fire in conditions of the use of chemical, bacteriological and nuclear weapons by the enemy, followed by degassing of equipment and sanitary treatment of personnel; holders on the rear inner panel of the cockpit for attaching a grenade launcher, machine gun and machine gun; stands in the design of a combat vehicle for installing a machine gun, machine gun and grenade launcher in them allowing to fire in conditions of the use of chemical, bacteriological and nuclear weapons by the enemy, followed by degassing of equipment and sanitary treatment of personnel; holders on the rear inner panel of the cockpit for attaching a grenade launcher, machine gun and machine gun; stands in the design of a combat vehicle for installing a machine gun, machine gun and grenade launcher in them allowing to fire in conditions of the use of

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As in the standard missiles M-21OF MLRS "Grad" and 9K27K MLRS "Uragan", the missile unit is single-chamber, consisting of two tubes. The data previously indicated by the author on the two-chamber rocket engine for the RSZO Smerch are unreliable [5, P.55].

The development of the charge for the propulsion system (rocket engine) of the rocket was carried out by the workers of the Lyubertsy Research and Production Association "Soyuz", now the Federal Center for Dual Technologies "Soyuz" (FTsDT "Soyuz").

The 9K58 "Smerch" MLRS is close to tactical missile systems due to its long firing range and effectiveness of target destruction, therefore, along with them, it was tested and put into service in military unit 42202.

In 1989, the second version of the Smerch system with the 9A52-2 combat vehicle and the 9T234-2 transport-loading vehicle was adopted.

At the DSA 90 exhibition (Defense Services Asia, Kualo Luampur, Malaysia), a photograph of the Smerch MLRS combat vehicle was presented to foreigners for the first time (see translation and original).

By the end of the 80s of the twentieth century - the first half of the 90s of the twentieth century, one can attribute a cycle of theoretical works to substantiate the principles of creating a guided missile with self-aiming combat elements, for which in 1995 Blinov Gennady Ivanovich (NPO Splav, now JSC "NPO" Splav "(Tula) became the Laureate of the S.I.Mosin Prize

In the course of the work carried out by GNPP "Splav" on a competitive basis with the State Unitary Enterprise KBP, to create a high-precision product for the "Smerch" system, a combined system was developed, in which the angular stabilization system worked out on the basis of the "Smerch" MLRS shell was successfully combined with created by the radio control system in the final section of the trajectory. The full-scale tests carried out confirmed the correctness of the fundamental decisions incorporated in the design, the possibility of controlling the flight of shells of this class. Based on the results of the competitive consideration of projects, the customer recommended the shell developed by the specialists of FSUE “GNPP“ Splav ”for further development.

Another area of research from 1991 to 1996 was the design development of a promising engine with increased power-to-weight ratio with automatic regulation of intra-chamber processes, which makes it possible to increase the total thrust impulse. This work was supervised by the candidate of technical sciences Yu.I. Watchmakers. The development has an interspecific character and can be used in the interests of the Army, Air Force and Navy. Later, within the framework of the Flang research and development project, the possibility of using this engine in the Uragan and Smerch MLRS was confirmed.

In the late 90s, development work began on the creation of a guided missile for the "Smerch" system.

Currently, the Smerch MLRS is in service with the armies of Russia, Azerbaijan (30), Armenia (6), Ukraine (94 systems, no data on the results of the war in Donbass), Belarus (40), Peru (10), Algeria (18), Kuwait (27), United Arab Emirates (6), Syria, Turkmenistan, Venezuela. In November 1995, a contract was signed for the supply of the Smerch MLRS to China, which was implemented. There is no public information about its adoption by the People's Liberation Army of China.

MLRS "Smerch" was used during military conflicts in the Chechen Republic, Syria, Ukraine, Nagorno-Karabakh.

In 2006, at the Special Faculty of the Mikhailovskaya Military Artillery Academy (MBAA, Russia, St. Petersburg), group classes on MLRS strike control were conducted with students of academic courses from India.

In 2007, at the training center, employees of the special faculty of the MBAA conducted practical exercises on the BM MLRS "Smerch" with students of academic courses from India.

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In 2010, at the training center, employees of the special faculty of the MBAA conducted practical exercises on the BM MLRS "Smerch" with students of academic courses from Turkmenistan.

In 2013, in the 3rd town, employees of the special faculty of the MBAA conducted practical exercises on the BM MLRS "Smerch" with students of academic courses from Azerbaijan.

To organize the serial production of body parts for MLRS "Uragan" and "Smerch" at the enterprises of the industry, specialized mills of the PPT-200, PPT-200S, PPT-350 and others models were purchased, which, according to 2005 data, were successfully used at a number of enterprises for the production of body details.

Composition:

The MLRS "Smerch" includes the following weapons:

- Fighting vehicle (BM) 9A52 or 9A52-2 (see diagram);
- Transport and loading vehicle (TZM) 9T234 or 9T234-2 (see layout diagram , in the stowed position , in the working position);
- 300mm rockets;
- Educational and training means 9F827;
- A set of special arsenal equipment and tools 9F819;
- Complex of automated fire control equipment (KSAUO) 9S729M1 "Slap-1" (see description UKSHM MP32M1 KSAUO)
- Topographic survey vehicle 1T12-2M;
- Radio direction-finding meteorological complex 1B44.

Initially, a modified chassis 79111 8x8, also known as "Oplot", was used for the 9A52 MLRS 9K58 "Smerch" combat vehicle, and a modified chassis 79112 8x8 was used for the 9T234 transport-loading vehicle. The chassis was assembled at the Minsk Automobile Plant (MAZ) in Belarus. Later, modified chassis of MAZ-543M 8x8 and MAZ-543A 8x8 trucks were used for the 9A52-2 and TZM 9T234-2 combat vehicles. On the MAZ-543M and MAZ-543A chassis, a 12-cylinder 4-stroke liquid-cooled diesel engine (D12A-525A diesel engine) with direct fuel injection with a power of 525 hp was installed. The cabins of the MAZ-543M and MAZ-543A chassis were made of polyester resin, reinforced with a woven fiberglass cloth. The MAZ-543M chassis was retrofitted with a control cabin when using the 9A52-2 combat vehicle as a base. The cockpit contains radio communications and fire control equipment. Cm.gallery of images of combat vehicle 9A52 MLRS "Smerch".

The artillery unit includes a package of 12 tubular guides, a swivel base, lifting, swivel and balancing mechanisms, sights, an electric drive and auxiliary equipment. The guides are smooth-walled pipes equipped with a screw U-shaped groove for the promotion of rockets. With the help of power-driven guidance mechanisms, the guide package can be guided in the vertical plane in the range of angles from 0 ° to + 55 °. The horizontal angle of fire is 60 ° (30 ° to the left and to the right of the longitudinal axis of the vehicle). Hydraulic supports are mounted between the wheels of the third and fourth axles, on which the stern part of the launcher is hung to increase its stability when firing.

To load the launcher, the 9K58 "Smerch" MLRS includes the 9T234-2 transport and loading vehicle. This machine has crane equipment and carries twelve shells. The process of loading the launcher is mechanized and is performed within 36 minutes.

The 300-mm shells of the Smerch MLRS have a classic aerodynamic configuration (see diagram) and are equipped with an efficient solid-propellant engine running on mixed fuel. A distinctive feature of the projectiles is the presence of a flight control system that corrects the trajectory of pitch and yaw (see the diagram of the electronic timing device and the control system unit). Due to the use of this system, the accuracy of hits of the "Tornado" was increased 2 times (it does not exceed 0.21% of the salvo range, that is, about 150 m, which brings it closer to artillery in accuracy), and the accuracy of fire - 3 times ... Correction is carried out by gas-dynamic rudders driven by high-pressure gas from an onboard gas generator. In addition, the stabilization of the projectile in flight occurs due to its rotation around the longitudinal axis, which is provided by preliminary untwisting while moving along the tubular guide and supported in flight by installing the blades of the drop-down stabilizer at an angle to the longitudinal axis of the projectile.

The ammunition load includes the following types of shells:

- With a range of up to 70 km:
  - 9M55F projectile with a detachable high-explosive fragmentation warhead;
  - 9M55K projectile with a cluster warhead equipped with fragmentation warheads;
  - 9M55K1 projectile with cluster warhead equipped with Motiv-3M self - aiming submunitions (see trajectory diagram);
  - 9M55K3 projectile with cluster warhead for anti-personnel mining of the terrain;
  - 9M55K4 projectile with cluster warhead for anti-tank mining of terrain;
  - 9M55K5 projectile with cluster warhead equipped with cumulative fragmentation submunitions ;
  - 9M55K6 projectile with cluster warhead equipped with 9N268 self-aiming submunitions;
  - 9M55K7 projectile with a cluster warhead equipped with small-sized self - aiming warheads;
  - 9M55S projectile with thermobaric warhead;
- Variants of the following projectiles with a range of up to 90 km were being worked out, most of which remained design work:
  - 9M525 projectile with cluster warhead equipped with fragmentation type combat elements;
  - 9M526 projectile with a cluster warhead equipped with Motiv-3M self - aiming submunitions
  - 9M527 projectile with cluster warhead for anti-tank mining of the terrain;
  - 9M528 projectile with a detachable high-explosive fragmentation warhead;
  - 9M529 projectile with thermobaric warhead;
  - 9M530 projectile with a penetrating high-explosive warhead;
  - 9M531 projectile with a cluster warhead equipped with cumulative fragmentation submunitions ;
  - 9M532 projectile with a cluster warhead equipped with small-sized self - aiming warheads;
  - 9M533 projectile with cluster warhead equipped with 9N268 self-aiming submunitions;
  - 9M534 projectile equipped with a small reconnaissance unmanned aerial vehicle;
  - 9M536 projectile with a cluster warhead equipped with penetrating fragmentation submunitions ;
  - 9M537 projectile with a cluster warhead equipped with non-contact detonation fragmentation submunitions ;
- For a foreign customer, a projectile with a flight range of up to 120 km was developed.
  - 9M542 projectile with a non-detachable high-explosive fragmentation warhead.

Shooting can be carried out with single shells or with a volley. A salvo of one car covers an area of 672 thousand square meters.

The modernization of BM 9A52-2 in terms of the introduction of combat control and communication equipment (ABUS) and an automated guidance and fire control system (ASUNO) made it possible to additionally provide:

- automated high-speed reception (transmission) of information and its protection from unauthorized access, visual display of information on the display and its storage;
- autonomous topographic location and orientation of the vehicle on the terrain with display on an electronic map;
- automated calculation of firing settings and flight mission data;
- aimless guidance of the package of guides without leaving the crew from the cockpit

An important contribution to increasing the combat effectiveness of the Smerch MLRS was made by the Vivarium automated fire control system developed and manufactured by the Tomsk production association Kontur. This system combines several command and staff vehicles at the disposal of the commander and chief of staff of the MLRS brigade, as well as subordinate commanders of divisions (up to three) and batteries (up to eighteen). Each of these machines, based on the KamAZ-4310 car, has an E-715-1.1 digital computer, displays, printers, communication facilities and secret communication equipment. The vehicles have autonomous power supply systems in position and in motion.

The equipment of the Vivarium command and staff vehicles provides information exchange with superior, subordinate and interacting control bodies, solves the tasks of planning concentrated fire and fire on columns, prepares data for firing, collects and analyzes information on the state of artillery units.

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Characteristics:

Fighting vehicle 9A52-2	
Chassis (modified)	MAZ-543M (8x8)
Length in stowed position, mm	12370
Width in stowed position, mm	3050
BM weight in combat position, t	43,7
Number of launch tubes	12
Time of preparation of BM for firing from the moment of receiving installations for firing to opening fire, min	1.5-3
Time of urgent leaving of the firing position after a salvo, min	one
Recharge time, min	16-20
Volley time, s	38
Calculation of a combat vehicle, people	four
TPM calculation, people	2
Climatic operating conditions	
Temperature range of RS combat use, ° C	-50 .. + 50
Surface wind, m / s	up to 20
Relative air humidity at 35 ° C,%	up to 98
Rain with intensity, mm / min	up to 2.7
Dust content of surface air, g / m3	up to 2
Height above sea level, m	up to 3000

Testing and operation:

On March 26, 1980, during testing of a prototype rocket with a high-energy ballistic solid propellant charge, launched from a facility based on ML-20, the missile part ruptured, resulting in damage to the facility. See the electronic image of the photo (front and back) from the family archive of Vyacheslav Ivanovich Podchufarov (Russia, Tula) - a participant in those works.

In 1980, Evgeny Alexandrovich Ganichev was awarded the S.I. Mosin for work on the topic "Development of the MLRS" Smerch ".

In 2002, the Smerch multiple launch rocket system "was successfully tested in India, during which it confirmed its unique strike characteristics."

Sivtsov Sergey Valentinovich - designer of control system elements. He made a significant contribution to the development of correcting switchgears for angular stabilization systems of MLRS "Smerch", "Uragan". He was directly involved in the development of these elements, testing and their introduction into mass production.

Sources:

1. ARABIAN GULF COUNTRIES - THE WORLD'S LARGEST ARMS MARKET. - MILITARY-TECHNICAL COOPERATION. Review of the Russian and foreign press. - 1997. - No. 15 (41). - April 7 - April 13, 1997 - P. 62.
2. S.V. Gurov "Multiple launch rocket systems." -Tula. "Peresvet", 2006. - P.87-102.
3. Journal of Technics - Youth # 12-1992.
4. Belov A.G. PROLETARSKY DISTRICT OF TULA CITY: YESTERDAY, TODAY, TOMORROW. - Tula: "Grif and K", 2004. - S. 133.
5. Belov E.A. Rotational drawing of body parts of rockets // Defense technology. - Special issue. - Moscow, 2005 - No. 6-7. - S. 113.
6. Fighting vehicle 9A52-2. Technical description 9A52-2.00.000 TO-E. Ed. No. 11 / 213315r-P94 s / n - S. 6,10,11,13,17-18.
7. S.V. Gurov From the history of the development of rocket artillery in Russia from the end of the 50s of the twentieth century to the present /

Proceedings of the Sixth International Scientific and Practical Conference (May 13-15, 2015) “War and weapons. New research and materials ”. In four parts. Part 2. - St. Petersburg: TsOP FGBU "VIMAIViVS" of the Ministry of Defense of the Russian Federation, 2015. - pp. 46-66.

8. Information collection. Military-technical cooperation // MTC. - No. 15. - April 12-18, 1999. - P.6.
9. Wheeled chassis 543 and its modifications. Technical description and instruction manual. Part 1, ed. 5, Ministry of Defense of the USSR, Main Automobile Department. Military Publishing House, Moscow: 1990. - P.13.20.
10. Evgeny Kochnev. _i_Family "Oplot" __ i_. Secret cars of the Soviet Army. Russian history. Library; URL: http://statehistory.ru/books/Evgeniy-Kochnev_Sekretnye-avtomobili-Sovetskoy-Armii/90
11. Laureates of the S.I. Mosin of the Twentieth Century: Biographical Collection and Subjects of the Works of the Participants-Winners of the Competitions / Ed. A.K. Talalaeva. - Tula: Grif and K, 2002 .-- p. 22.
12. People, years, volleys. 60 years of FSUE “GNPP“ Splav ”/ FSUE“ GNPP “Splav”: Compiled by E.M. Martynov, edited by N.A. Makarovets; ed. board: G.A. Denezhkin, R.A. Kobylin, G.I. Blinov. - Tula: JSC "Tula Printing House", 2009. - S. 37.58-59.85.
13. Makarovets N.A. Remember the past, creating the future // Integral. - No. 3 (23) May-June 2005. - P. 4-5.
14. Makarovets N.A., Zakharov O.L., Samoilova A.V. Development of MLRS "Grad", "Uragan", "Smerch", "Prima" and other systems in 1970-1991. // SKETCHES OF THE HISTORY OF ARTILLERY OF THE RUSSIAN STATE. Ground artillery (edited by Lieutenant General N.M. Parshin, Head of the GRAU of the Russian Ministry of Defense). Compiled by M.A. Pervov - M .: Stolichnaya encyclopedia, 2017 .-- P. 432.
15. Makarovets N.A., Ustinov L.A., Avotyn B.A. Multiple launch rocket systems and their effectiveness. - Tula .: TulSU. - 2005 .-- S. 51.

16. Models of rockets in the exposition of the Military Historical Museum of Artillery, Engineering and Signal Corps (Saint Petersburg) (See galleries 1 , 2) and in the collection of the Mikhailovskaya Military Artillery Academy (Saint Petersburg). (See gallery).
17. ON RUSSIA'S PARTICIPATION IN THE INTERNATIONAL EXHIBITION OF WEAPONS DEFEXPO INDIA'2004. [Electronic resource]. Updated date: 11.02.2004 // URL: http://www.mid.ru/web/guest/maps/in/-/asset_publisher/EpJ5G4lcymvb/content/id/485856 (date accessed: 01.08.)
18. Multipurpose rocket launcher "Smerch". Translation without indication of the source.
19. Export passport No. 2340/00 / NEC for a 300-mm 9M55K rocket with a warhead with fragmentation warheads. Re-registered on April 30, 2004. Copy.

20. Export passport №2328 / 00 / NEC for a 300-mm 9M55F rocket with a high-explosive fragmentation warhead. Re-registered on April 30, 2004. Copy.
21. Export passport No. 2334/00 / NEC for a 300-mm 9M55K1 rocket with a self-aiming warhead. Re-registered 09/02/2004 Copy.
22. Export passport No. 2330/00 / NEC for a 300-mm 9M55K4 rocket for anti-tank mining of the area. Re-registered 09/02/2004 Copy.
23. Export passport No. 2326/00 / NEC for a 300-mm 9M55K5 rocket with a HEAT warhead. Re-registered 09/02/2004 Copy.
24. Export passport No. 2752/01 / NEC for a 300-mm 9M55K6 rocket with a 9N268 self-aiming warhead. Re-registered 09/02/2004 Copy.
25. Export passport No. 2541/05 / NEC for a 300-mm 9M55K7 rocket with a warhead with small-sized self-aiming warheads. Approved 04/05/2005 Copy.
26. Export passport No. 2323/00 / NEC for a 300-mm 9M55S rocket with a thermobaric warhead. Re-registered 09/02/2004 Copy.
27. Export passport No. 2539/05 / NEC for the 300-mm training projectile 9M55UT. Approved on 04.05.2005. Copy.
28. Export passport No. 4136/04 / NEC for a 300-mm 9M525 rocket with a warhead with fragmentation warheads. Approved on July 8, 2004. Copy.
29. Export passport No. 6142/04 / NEC for a 300-mm 9M526 rocket with a warhead with self-aiming warheads for the Smerch multiple launch rocket system. Approved on September 30, 2004. Copy.
30. Export passport No. 6144/04 / NEC for a 300-mm 9M527 rocket with a warhead with anti-tank mines. Approved on September 30, 2004. Copy.
31. Export passport No. 3050/00 / NEC for a 300-mm 9M528 rocket with a detachable high-explosive fragmentation warhead. Approved 02.09.2004.Copy.
32. Export passport No. 4138/04 / NEC for a 300-mm 9M529 rocket with a thermobaric warhead. Approved on July 8, 2004. Copy.
33. Export passport No. 6146/04 / NEC for a 300-mm 9M530 rocket with a penetrating high-explosive warhead. Approved on September 30, 2004. Copy.
34. Export passport No. 6148/04 / NEC for a 300-mm rocket 9M531 with a warhead with cumulative fragmentation warheads for the Smerch multiple launch rocket system. Approved on September 30, 2004. Copy.
35. Export passport No. 6150/04 / NEC for a 300-mm 9M532 rocket with a warhead with small self-aiming warheads. Approved on September 30, 2004. Copy.
36. Export passport No. 6152/04 / NEC for a 300-mm 9M533 rocket with a 9N268 self-aiming warhead. Approved on September 30, 2004. Copy.
37. Export passport No. 6154/04 / NEK for a 300-mm rocket 9M534 with a warhead with a reconnaissance unmanned aerial vehicle. Approved on September 30, 2004. Copy.
38. Export passport No. 6156/04 / NEC for a 300-mm 9M536 rocket with a warhead with penetrating high-explosive fragmentation warheads. Approved on September 30, 2004. Copy.
39. Export passport No. 6158/04 / NEC for a 300-mm 9M537 rocket with a warhead with non-contact explosive fragmentation warheads. Approved on September 30, 2004. Copy.
40. AFTERWORD TO THE EXHIBITION OF WEAPONS “IDEX-97” / SOME RESULTS FOR RUSSIA OF PREVIOUS EXHIBITIONS IN ABU DHABI. - MILITARY-TECHNICAL COOPERATION. Review of the Russian and foreign press. - March 31 - April 6, 1997 - No. 14 (40). - P. 51. Prize named after S.I. Mosin: from century to century. - M .: Publishing House "Arms and Technologies", 2018. - P. 205.
41. Prize named after S.I. Mosin: from century to century. - M .: Publishing House "Arms and Technologies", 2018. - P. 434,435.
42. Rocket projectile 9M55K. Technical description and operating instructions 9M55K.00.000 RE-E3.16-01-10. Export option. - S. 18; Figure 5 (2 sheets).
43. Advertising passport No. 2337/00 / NEC for a 300-mm 9M55K rocket with a warhead with fragmentation warheads. Re-registered on April 30, 2004. Copy.
44. Advertising passport No. 2329/00 / NEC for a 300-mm 9M55F rocket with a high-explosive fragmentation warhead. Re-registered on April 30, 2004. Copy.
45. Advertising passport No. 2335/00 / NEC for a 300-mm 9M55K1 rocket with a self-aiming warhead. Re-registered 09/02/2004 Copy.

46. Advertising passport No. 2331/00 / NEC for the 300-mm 9M55K4 rocket for anti-tank mining of the area. Re-registered 09/02/2004 Copy.
47. Advertising passport №2327 / 00 / NEC for a 300-mm rocket projectile 9M55K5 with a warhead with cumulative fragmentation warheads. Re-registered 09/02/2004 Copy.
48. Advertising passport No. 2753/01 / NEC for a 300-mm 9M55K6 rocket with a 9N268 self-aiming warhead. Re-registered 09/02/2004 Copy.
49. Advertising passport No. 2542/05 / NEC for a 300-mm rocket 9M55K7 with a warhead with small-sized self-aiming warheads. Approved 04/05/2005 Copy.
50. Advertising passport №2325 / 00 / NEC for a 300-mm rocket 9M55S with a thermobaric warhead. Re-registered 09/02/2004 Copy.
51. Promotional passport No. 2540/05 / NEC for 300-mm training projectile 9M55UT. Approved on 04.05.2005. Copy.
52. Advertising passport No. 4137/03 / NEC for a 300-mm rocket 9M525 with a warhead with fragmentation warheads. Approved on July 8, 2004. Copy.
53. Advertising passport No. 6143/04 / NEK for a 300-mm rocket 9M526 with a warhead with self-aiming warheads for the Smerch multiple launch rocket system. Approved on 09/30/2004. Copy.
54. Promotional passport No. 6144/04 / NEC for a 300-mm 9M527 rocket with a warhead with anti-tank mines. Approved on September 30, 2004. Copy.
55. Advertising passport No. 3051/00 / NEC for a 300-mm rocket projectile 9M528 with a detachable high-explosive fragmentation warhead. Approved 02.09.2004.Copy.
56. Promotional passport No. 4139/04 / NEC for a 300-mm 9M529 rocket with a thermobaric warhead. Approved on July 8, 2004. Copy.
57. Advertising passport No. 6146/04 / NEC for a 300-mm 9M530 rocket with a penetrating high-explosive warhead. Approved on September 30, 2004
58. Advertising passport No. 6149/04 / NEK for a 300-mm rocket 9M531 with a warhead with cumulative fragmentation warheads for the Smerch multiple launch rocket system. Approved on September 30, 2004. Copy.
59. Advertising passport No. 6151/04 / NEC for a 300-mm rocket 9M532 with a warhead with small-sized self-aiming warheads. Approved on September 30, 2004. Copy.
60. Advertising passport No. 6153/04 / NEK for a 300-mm 9M533 rocket with a 9N268 self-aiming warhead. Approved on September 30, 2004. Copy.
61. Advertising passport No. 6155/04 / NEK for a 300-mm rocket 9M534 with a warhead with a reconnaissance unmanned aerial vehicle. Approved on September 30, 2004. Copy.
62. Advertising passport No. 6157/04 / NEK for a 300-mm rocket projectile 9M536 with a warhead with high-explosive fragmentation warheads of a penetrating type. Approved on September 30, 2004. Copy.
63. Advertising passport No. 6159/04 / NEC for a 300-mm 9M537 rocket with a warhead with non-contact detonation fragmentation warheads. Approved on September 30, 2004. Copy.
64. 9M55F rocket projectile. Technical description and operating instructions 9M55F.00.000 TO. - 1989 .-- S. 4.5.
65. 9M55K1 rocket projectile. Technical description and operating instructions 9M55K1.00.000 TO. - 1988 .-- S. 4.
66. Special faculty (1953-2013). 60 issues. Historical sketch. Mikhailovskaya Military Artillery Academy. - SPb. - 2014 .-- S. 105,106,111,114.
67. Photos taken by the author of this work at the exhibition within the framework of the International Forum “Technologies in Mechanical Engineering-2014”.
68. Shunkov V.N. "Rocket Weapon". - Minsk: LLC "Potpourri", 2001. - 528s.
69. URL: http://www.uomz.ru/about/pressa_o_nas/kryilyami_rabotay
70. 300-mm long-range multiple launch rocket system "Smerch" / GNPP "Splav" /
71. URL: http://brown-moses.blogspot.ru/2014/02/more-evidence-of-bm-30-smerch-launched.html
72. URL: https://missilery.info/gallery/raketnaya-tehnika-v-nyneshnem-voennom-konflikte-na-ukraine
73. URL: https://missilery.info/gallery/raketnaya-tehnika-v-nyneshnem-voennom-konflikte-na-ukraine-chast-2
74. URL: http://rt.com/in-vision/venezuela-drill-artillery-2015/
75. URL: http://www.offroadvehicle.ru/AZBUCAR/MZKT/Oplot.pdf
76. URL: https://ru.armeniasputnik.am/politics/20180601/12409698/armeniya-v-2017-godu-poluchila-6-edinic-rszo-smerch-azerbajdzhan-61-bmp-i-btr.html
77. URL: http://russia-armenia.info/node/48733
78. URL: http://armiya.az/ru/news/122653/Armenia- used-complexes-Tornado-Ouzz ,-an-ne-tornado-Soose-military-expert
79. URL: http://novostink.ru/politics/151659-posol-v-obse-pravo-naroda-nagornogo-karabaha-na-samoopredelenie-ne-mozhet-byt-postavleno-pod-somnenie.html
80. Defense enterprises in the years of war and peace (in two volumes). Volume two. / Milekhin Yu.M. FSUE "FTsDT" Soyuz "during the Great Patriotic War and peacetime. - M .: Publishing House "Arms and Technologies", 2020. - P. 103.

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Analogues by appointment and basing:

Multiple launch rocket system 9K515 "Tornado-S"

[Multiple launch rocket system 9K57 "Uragan"]

[Fighting vehicle for RS SAKR]

[Fighting vehicle BM-14-17 (index 8U36)]

[Multiple launch rocket system HIMARS]

[Fighting vehicle RM-70]

System M-14

Multiple launch rocket system 9K512 "Uragan-1M"

Field reactive system M-21

Experienced multifunctional MML launcher

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